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(71) Applicant(s)

**Delphi Technologies, Inc.**  
(Incorporated in USA - Delaware)  
P.O. Box 5052, Troy, Michigan 48007,  
United States of America

(72) Inventor(s)

**Andreas Urbaniak**  
**Martin Ludwig**

(74) Agent and/or Address for Service

**M J Denton**  
**Delphi Automotive Systems,**  
31 Carlton Hill, LONDON, NW8 0JX,  
United Kingdom

(51) INT CL<sup>7</sup>

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(52) UK CL (Edition V)

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(56) Documents Cited

**US 6468104 B2**

**US 6027364 A**

**US 4867699 A**

(58) Field of Search

**UK CL (Edition T) H2E**

**INT CL<sup>7</sup> H01R**

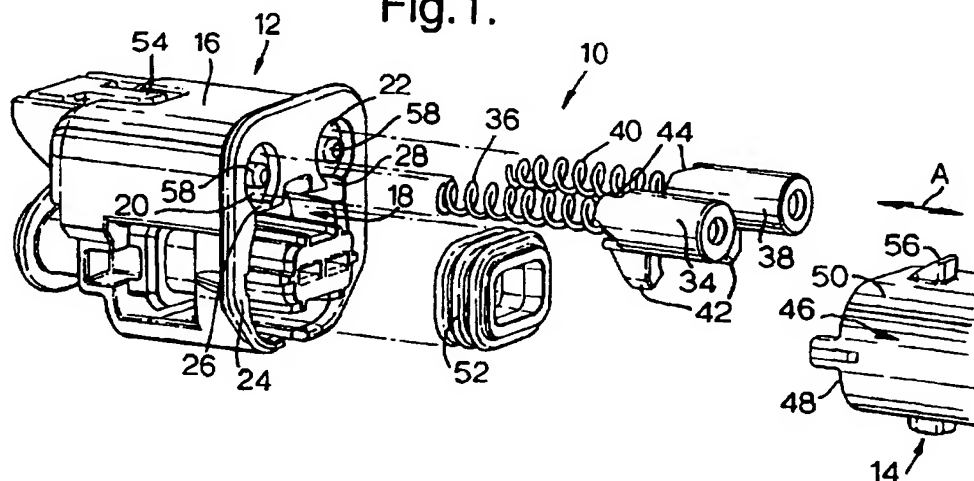
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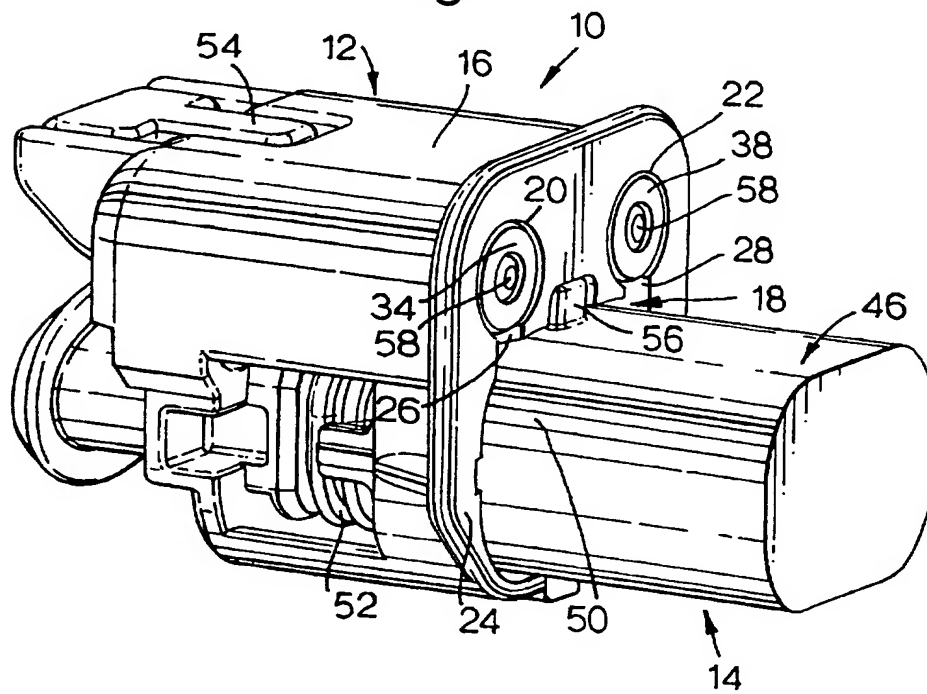
(54) Abstract Title

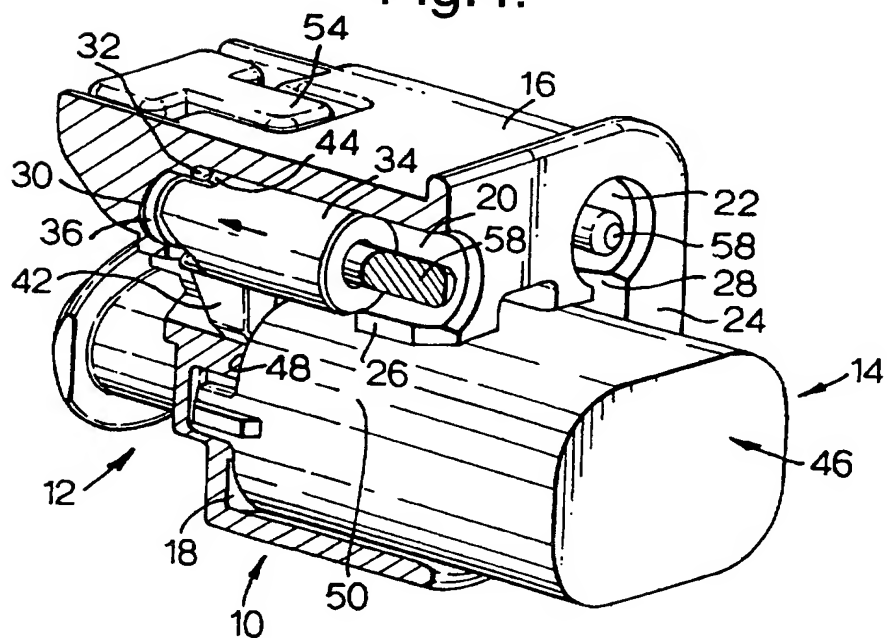
**Two part electrical connector having GO-NOGO feature**

(57) A two part electrical connector (10) having first (16) and second (14) housings with associated bores that are slidably assembled in an axial direction (A). There are electrical terminals in the first housing which are designed to connect with terminals in the second housing. The connector is characterised by having a sliding member (34) with a radially extending tab (42) to extend into the first bore (18) and an axially extending lug (32 Fig 4) in the second bore, the lug acts on the sliding member to cause it to rotate during assembly against the bias of a spring (40), on full mating the slide member moves away from the closed end of the bore, under spring bias, toward the outer surface of the housing whilst simultaneously tripping a latching arrangement (54) to hold the two housing together. Incorrect assembly results in spring bias forcing the two halves apart.

**Fig.1.**







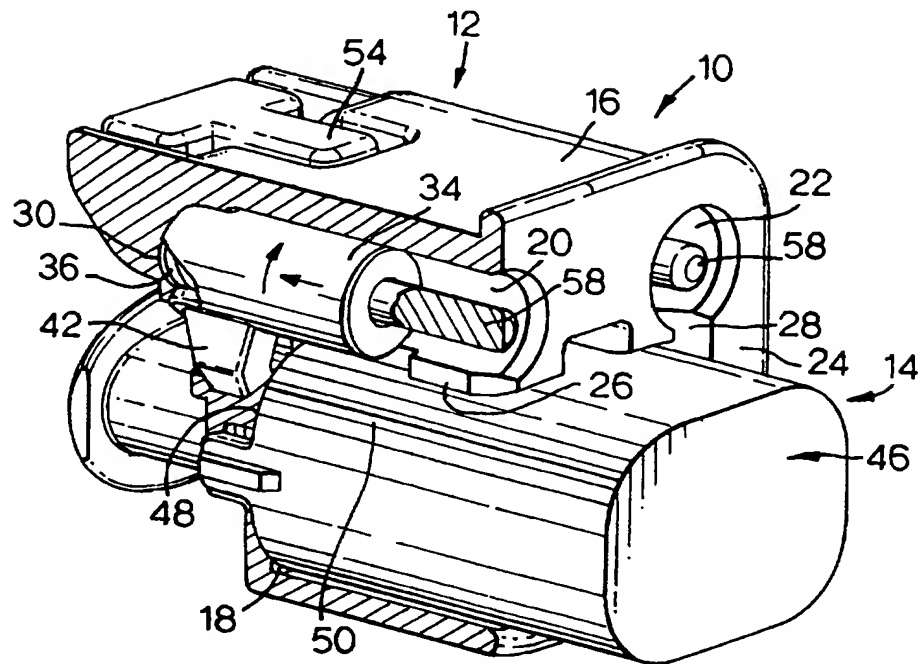


Fig.6.

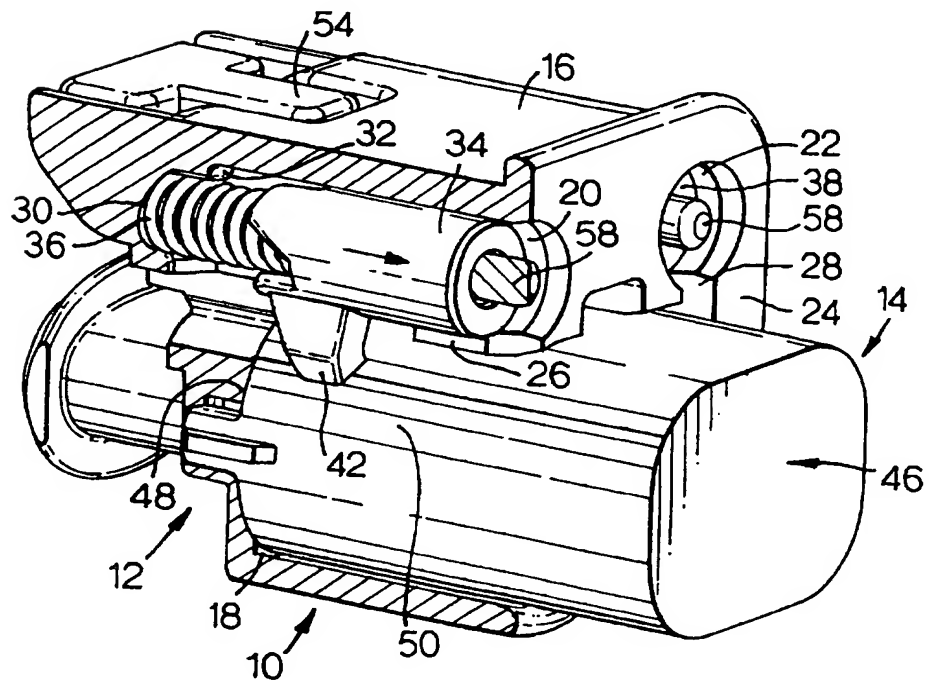


Fig.7.

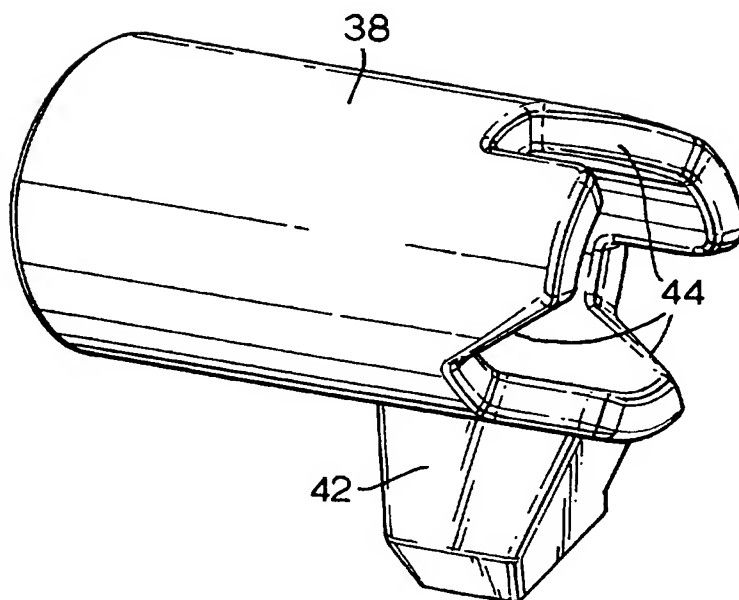


Fig.8.

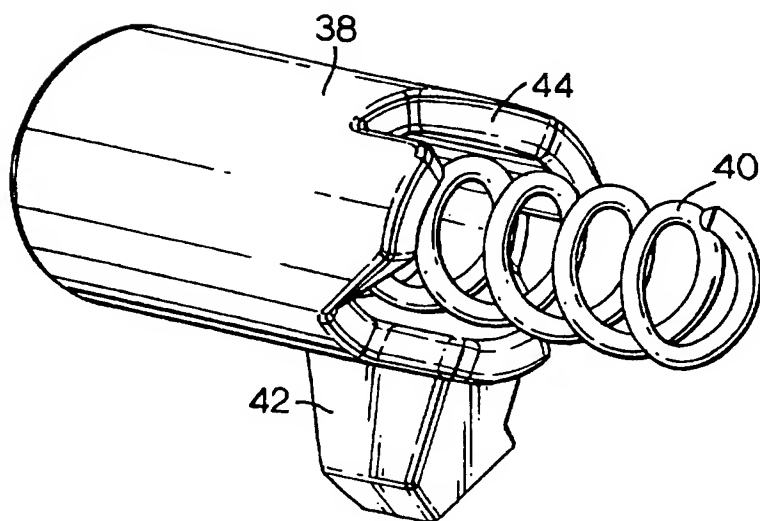


Fig.9.

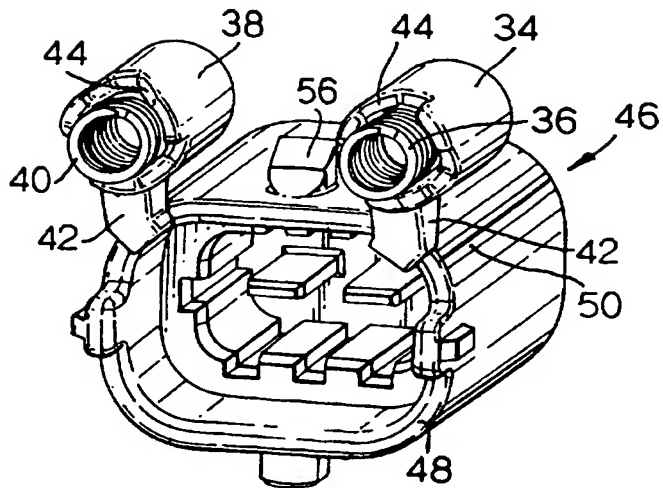


Fig.10.

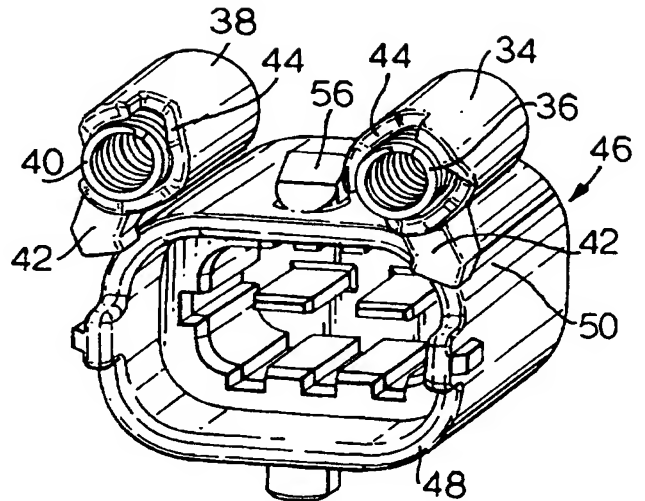


Fig.11.

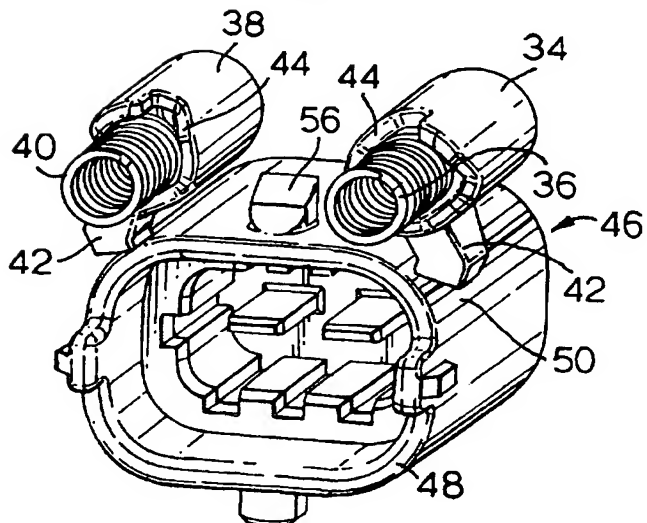


Fig.12.

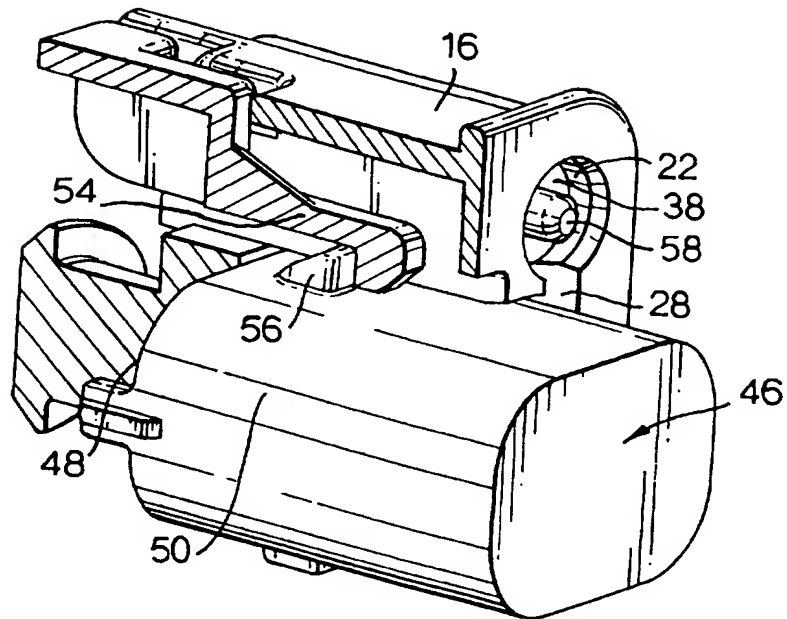
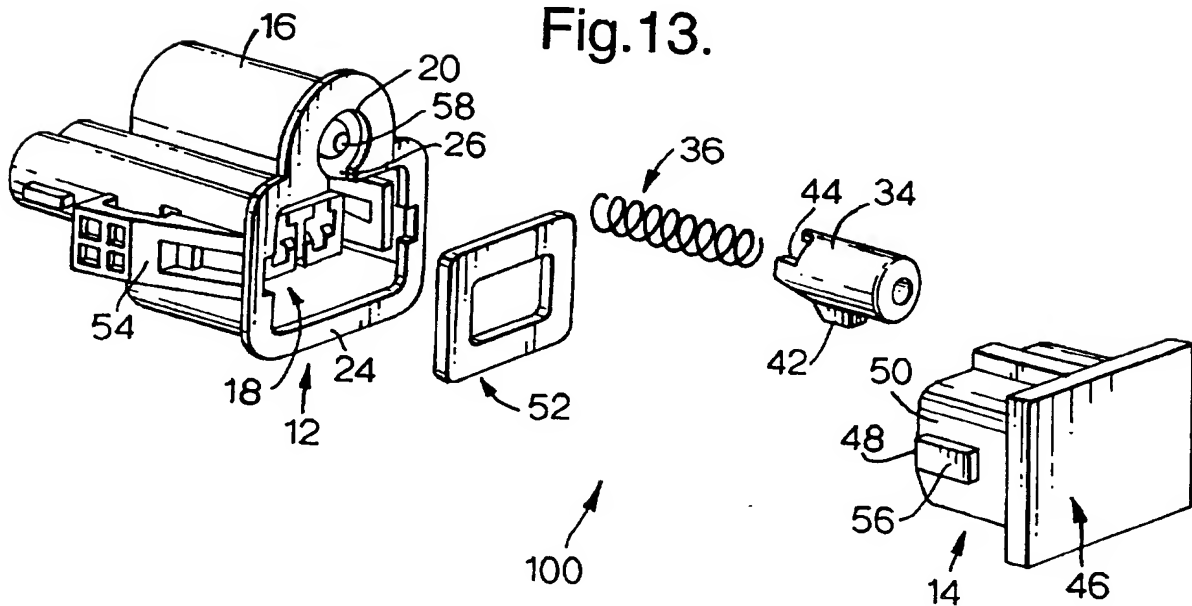


Fig.13.



DP-306600

**TWO-PART ELECTRICAL CONNECTOR**Technical Field

5                   The present invention relates to a two-part electrical connector which has a GO-NOGO feature.

Background of the Invention

10                  Two-part electrical connectors having a GO-NOGO system are known. The GO-NOGO system acts to bias the two parts apart until the two parts are fully mated.

Summary of the Invention

15                  The present invention provides an improved two-part electrical connector with a GO-NOGO system.

                  A two-part electrical connector in accordance with the present invention comprises a first part and a second part which are movable relative to one another in an axial direction for mating;

20                  the first part including a housing; a first bore in the housing extending in the axial direction and opening through a front face of the housing; electrical terminals positioned in the housing; a second bore in the housing extending in the axial direction having an open end at the front face and a closed end remote from the open end, and opening into the first bore; a slide member located in the second bore and movable relative to the housing

25                  in the axial direction; and a spring member located in the second bore between the closed end of the second bore and the slide member;

                  the second part including a header having a front face and an outer surface, the header making a sliding fit in the first bore during mating; and electrical terminals positioned in the header for mating with the electrical

30                  terminals of the first part;



wherein the slide member has a radially extending tab which extends into the first bore; wherein the closed end of the second bore has an axially extending lug; wherein the slide member has an angled surface engageable by the lug to cause the slide member to rotate about its axis as the  
 5 slide member moves towards the closed end; and

wherein, on mating, the front face of the header engages the tab on the slide member, the slide member moves against the bias of the spring member towards the closed end of the second bore, the angled surface of the slide member engages the lug to rotate the slide member, and, on full mating,  
 10 the slide member moves away from the closed end of the bore under the bias of the spring member with the tab sliding along the outer surface of the header.

#### Brief Description of the Drawings

15 The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is an exploded view of a first embodiment of the present invention;

Figure 2 is a side view of the present invention with the two  
 20 parts at the start of mating;

Figure 3 is a cross-section view of Figure 2;

Figure 4 is a cross-section view of the present invention during mating;

Figure 5 is a cross-section view of the present invention at the  
 25 fully mated position before final movement of the sliders;

Figure 6 is a cross-section view of the present invention in the fully mated position;

Figure 7 is an enlarged side view of one of the slider members;

Figure 8 is an enlarged side view of one of the slider members  
 30 and its associated spring;

Figures 9 to 11 shows the relative positions of the slider members, springs and the header during the mating process;

Figure 12 is a cross-sectional view of the latch arm and latch tab; and

5                    Figure 13 is an exploded view of a second embodiment of the present invention.

#### Description of the Preferred Embodiment

Referring to Figures 1 to 12 of the drawings, a first  
10                    embodiment of a two-part electrical connector 10, in accordance with the present invention, comprises a first part 12 (female connector) and a second part 14 (male connector). The first and second parts 12,14 are movable relative to one another in an axial direction A for mating and unmating.

The first part 12 comprises a housing 16. The housing 16 has a  
15                    first bore 18, a second bore 20, and a third bore 22, all of which extend in the axial direction A, and all of which open through the front face 24 of the housing. The second bore 20 also opens (in a radial direction), by way of an axially extending slot 26, into the first bore 18. Similarly, the third bore 22 opens into the first bore 18 by way of an axially extending slot 28. The closed  
20                    end 30 of the second bore 20 has an axially extending lug 32. Similarly, the closed end of the third bore 22 has an axially extending lug.

A slide member 34 is positioned in the second bore 20. The slide member 34 is movable in the axial direction A relative to the housing 16. A helical coil spring 36 is also positioned in the second bore 20 between the  
25                    closed end 30 and the slide member 34. The spring 36 acts on the slide member 34 to bias the slide member away from the closed end 30. In a similar manner, a slide member 38 and spring 40 is positioned in the third bore 22. Each slide member 34,38 has a radially extending tab 42 which extends through the associated slot 26,28 into the first bore 18. Each slide  
30                    member 34,38 also has an angled surface 44 at its end adjacent the closed end 30 of the respective second or third bore 20,22. During movement of the

slide member 34,38 towards the closed end 30 of their respective bores 20,22, the lug 32 engages the angled surface 44 to cause the slide member to rotate about its axis. In a preferred arrangement, each slide member 34,38 is tubular and is slideable on an axially extending rod 58 secured in the second and third bores 20,22.

The second part 14 comprises a header 46 having a front face 48 and an outer surface 50. The header 46 makes a sliding fit in the first bore 18 of the housing 16 of the first part 12.

Complementary electrical terminals (not shown) are positioned in the housing 16 and the header 46 for electrical connection with one another when the first and second parts 12,14 mate. A seal 52 is positioned in the first bore 18 which is engaged by the front face 48 of the header 46 when the first and second parts 12,14 mate. The housing 16 also includes a resilient latch arm 54, and the header 46 has a corresponding latch tab 56.

The arrangement for mating is illustrated in Figures 3 to 6. The relative positions of the slider members 34,38, their tabs 42, and the header 46 during the mating process are also illustrated in Figures 9 to 11. In an initial position (Figure 3), the header 46 is positioned in the first bore 18 of the housing 16, and the front face 48 of the header engages the tab 42 of each slide member 34,38. As the header 46 is pushed into the first bore 18 (Figures 4 and 9), the slide members 34,38 are pushed towards the closed ends 30 of their respective bores 20,22 against the bias of the springs 36,40. As the header 46 continues to be pushed into the first bore 18, the angled surfaces 44 of the slider members 34,38 engage the lugs 32 in their respective bores 20,22 (Figures 5 and 10) causing the slide members to rotate about their axes. When the header 46 reaches the fully mated position, the slide members 34,38 have rotated far enough for the tabs 42 to become disengaged from the front face 48 allowing the slide members 34,38 to return to their initial position under the bias of the springs 36,40, with the tabs sliding along the outer surface 50 of the header (Figures 6 and 11). Substantially

simultaneously, the latch arm 54 makes a snap-fit with the latch tab 56 to retain the header 46 in the fully mated position.

Should the header 46 fail to reach the fully mated position, the bias of the springs 36,40 will push the header out of the first bore 18 by way of the tabs 42 acting on the front face 48 of the header. The springs and slide members therefore provide a GO-NOGO feature for the two-part electrical connector 10. To release the first and second parts 12,14, the latch arm 54 is pivoted to disengage from the latch tab 56.

Figure 13 shows a second embodiment of a two-part electrical connector 100 in accordance with the present invention. In this second embodiment, like parts have been given the same reference numeral as in the above described first embodiment. The connector 100 of the second embodiment differs from the first embodiment in that the third bore is omitted, and the connector 100 only has a single slide member 34 and spring 36. The operation of the connector 100 is substantially identical to the operation described above for the first embodiment.

Claims

1. A two-part electrical connector comprising a first part and a second part which are movable relative to one another in an axial direction for mating;

5 the first part including a housing; a first bore in the housing extending in the axial direction and opening through a front face of the housing; electrical terminals positioned in the housing; a second bore in the housing extending in the axial direction having an open end at the front face and a closed end remote from the open end, and opening into the first bore; a slide member located in the second bore and movable relative to the housing  
10 in the axial direction; and a spring member located in the second bore between the closed end of the second bore and the slide member;

the second part including a header having a front face and an outer surface, the header making a sliding fit in the first bore during mating; and electrical terminals positioned in the header for mating with the electrical  
15 terminals of the first part;

wherein the slide member has a radially extending tab which extends into the first bore; wherein the closed end of the second bore has an axially extending lug; wherein the slide member has an angled surface engageable by the lug to cause the slide member to rotate about its axis as the  
20 slide member moves towards the closed end; and

wherein, on mating, the front face of the header engages the tab on the slide member, the slide member moves against the bias of the spring member towards the closed end of the second bore, the angled surface of the slide member engages the lug to rotate the slide member, and, on full mating,  
25 the slide member moves away from the closed end of the bore under the bias of the spring member with the tab sliding along the outer surface of the header.

2. A two-part electrical connector as claimed in Claim 1, wherein the housing of the first part includes a latch arm; and the header of

the second part includes a latch tab; the latch arm making a snap-fit with the latch tab when the first and second parts are fully mated.

3. A two-part electrical connector as claimed in Claim 1 or Claim 2, wherein the first part further comprises a third bore which is substantially identical to the second bore; a slide member positioned in the third bore and movable relative to the housing in the axial direction; and a  
5 spring member located in the third bore between the closed end of the third bore and the slide member; wherein the slide member in the third bore has a radially extending tab which extends into the first bore and which is engageable by the front face of the header; wherein the closed end of the third  
10 bore has an axially extending lug; wherein the slide member in the third bore has an angled surface engageable by the lug in the third bore to cause the slide member to rotate about its axis as the slide member moves towards the closed end.

4. A two-part electrical connector as claimed in any one of Claims 1 to 3, wherein the or each spring member is a helical coil spring.

5. A two-part electrical connector as claimed in any one of Claims 1 to 4, wherein the or each slide member is substantially tubular and is slideable on an axially extending rod positioned in the respective bore.

6. A two-part electrical connector as claimed in any one of Claims 1 to 5, further comprising a seal member positioned in the first bore and engageable by the front face of the header.

7. A two-part electrical connector substantially as herein described with reference to, and as shown in, the accompanying drawings.



INVESTOR IN PEOPLE

**Application No:** GB 0224642.9  
**Claims searched:** 1 - 7

**Examiner:** Gareth Jones  
**Date of search:** 20 December 2002

## Patents Act 1977 : Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
A	-	(FUKASE)	US 6,468,104 B2
A	-	(ODA et al)	US 6,027,364
A	-	(FUKADA)	US 4,867,699

### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>T</sup>:

H2E

Worldwide search of patent documents classified in the following areas of the IPC<sup>7</sup> :

H01R

The following online and other databases have been used in the preparation of this search report :

EPODOC, JAPIO, WPI